

What we claim is:

1. A fuel cell assembly, which has a housing defining an electricity generation/combustion chamber, and  
5 electricity generation/combustion means disposed within said housing, and in which a fuel gas and an oxygen-containing gas are supplied to said electricity generation/combustion means, and a combustion gas formed within said electricity generation/combustion chamber is  
10 discharged from said electricity generation/combustion chamber,

wherein a heat exchanger having a first channel and a second channel is disposed on at least one surface of said housing,

15 said combustion gas is discharged from an interior of said electricity generation/combustion chamber through said first channel of said heat exchanger, and

one of said oxygen-containing gas and said fuel gas is supplied to said electricity generation/combustion  
20 means through said second channel of said heat exchanger.

2. The fuel cell assembly according to claim 1, wherein

said first channel and said second channel in said  
25 heat exchanger are superposed in a thickness direction of said surface, and

said first channel and said second channel are opposed channels extending zigzag.

30 3. The fuel cell assembly according to claim 1, wherein

said housing has opposite flat side surfaces extending substantially vertically, and

said heat exchanger is flat plate-shaped and is  
35 disposed on each of said opposite side surfaces.

4. The fuel cell assembly according to claim 1,  
wherein

there are disposed a lower gas chamber located in a  
5 lower end portion of said housing, an upper gas chamber  
located in an upper end portion of said housing, and a  
communication gas chamber extending in an up-and-down  
direction within said housing to bring said upper gas  
chamber and said lower gas chamber into communication,

10 said second channel has an inflow port disposed at  
a lower end of said heat exchanger, and an outflow port  
disposed at an upper end of said heat exchanger and  
leading to said upper gas chamber, and

one of said oxygen-containing gas and said fuel gas  
15 is flowed into said second channel through said inflow  
port, and is supplied from said second channel to said  
electricity generation/combustion means through said upper  
gas chamber, said communication gas chamber, and said  
lower gas chamber.

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5. The fuel cell assembly according to claim 1,  
wherein

reforming means is disposed within said electricity  
generation/combustion chamber,

25 said fuel gas is supplied to said electricity  
generation/combustion means through said reforming means,  
and

said oxygen-containing gas is supplied to said  
electricity generation/combustion chamber through said  
30 second channel.

6. The fuel cell assembly according to claim 1,  
wherein

a plurality of electricity generation units are  
35 arranged in parallel within said housing,

said electricity generation/combustion means includes a cell stack composed of a plurality of cells, each of said electricity generation units includes said cell stack, a fuel gas case defining a fuel gas chamber, a reforming case, an unreformed gas supply pipe connected to said reforming case, and a fuel gas feed pipe connecting said reforming case and said fuel gas case, said cells of said cell stack are arranged on one surface of said fuel gas case, said fuel gas within said fuel gas case is supplied to said cells, and said oxygen-containing gas is supplied through said second channel of said heat exchanger.

7. The fuel cell assembly according to claim 6, wherein said plurality of cells are disposed upright on an upper surface of said fuel gas case, and said reforming case is placed above said cell stack.

8. The fuel cell assembly according to claim 6, wherein in each of said electricity generation units, said fuel gas case is in a slenderly extending rectangular parallelepipedal shape, and said cells are arranged in line in a longitudinal direction of said fuel gas case.

9. The fuel cell assembly according to claim 6, wherein in each of said electricity generation units, said reforming case slenderly extends along said fuel gas case above said cell stack, said unreformed gas supply pipe is connected to one end portion of said reforming case, and said fuel gas feed pipe connects said reforming case and said fuel gas case at other end portion of said

reforming case.

10. The fuel cell assembly according to claim 1,  
wherein

5 said electricity generation/combustion means  
includes a plurality of cell stacks,

a first gas case supplied with one of said oxygen-  
containing gas and said fuel gas is disposed within said  
housing,

10 said first gas case has a hollow-shaped manifold  
portion, and a plurality of hollow-shaped ejection  
portions protruding from one-side flat surface of said  
manifold portion substantially perpendicularly to said  
one-side flat surface,

15 said ejection portions are arranged with spacing in  
a first direction on said one-side flat surface,

an ejection hole is formed in at least one surface  
of each of said ejection portions, and

20 each of said cell stacks is placed between the  
adjacent ejection portions.

11. The fuel cell assembly according to claim 10,  
wherein

25 said manifold portion is placed substantially  
horizontally, with said one-side flat surface being  
directed upwards.

12. The fuel cell assembly according to claim 10,  
wherein

30 said ejection hole is in a form of a slit parallel  
to said one-side flat surface and extending in a second  
direction perpendicular to said first direction.

13. The fuel cell assembly according to claim 10,  
35 wherein

a plurality of second gas cases of a hollow rectangular parallelepipedal shape placed on said one-side flat surface of said manifold portion between the adjacent ejection portions of said first gas case and extending in said second direction are disposed within said housing, the other of said oxygen-containing gas and said fuel gas is supplied to said second gas cases, and each of said cell stacks is placed on each of said second gas cases.

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14. The fuel cell assembly according to claim 1, further comprising

an upper gas chamber disposed in an upper portion of said housing, and

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a plurality of gas introduction members hanging down from said upper gas chamber, and

wherein one of said oxygen-containing gas and said fuel gas is supplied through said upper gas chamber and said gas introduction members.

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15. The fuel cell assembly according to claim 14, wherein

said electricity generation/combustion means includes a plurality of cell stacks each composed of a plurality of cells,

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said cell stacks are arranged in parallel with spacing in a horizontal direction, and

said gas introduction members are pipes hanging down between said cell stacks and having lower ends open.

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16. An electricity generation unit comprising:

a fuel gas case defining a fuel gas chamber;

a cell stack composed of a plurality of cells arranged on one surface of said fuel gas case;

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a reforming case;

an unreformed gas supply pipe connected to said reforming case; and

a fuel gas feed pipe connecting said reforming case and said fuel gas case, and

5 wherein a fuel gas within said fuel gas case is supplied to said cells.

17. The electricity generation unit according to claim 16, wherein

10 said plurality of cells are disposed upright on an upper surface of said fuel gas case, and

said reforming case is placed above said cell stack.

18. The electricity generation unit according to claim 15 16, wherein

said fuel gas case is in a slenderly extending rectangular parallelepipedal shape, and

said cells are arranged in line in a longitudinal direction of said fuel gas case.

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19. The electricity generation unit according to claim 16, wherein

said reforming case slenderly extends along said fuel gas case above said cell stack,

25 said unreformed gas supply pipe is connected to one end portion of said reforming case, and

said fuel gas feed pipe connects said reforming case and said fuel gas case at other end portion of said reforming case.

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20. A fuel cell assembly comprising:

a housing defining an electricity generation/combustion chamber; and

35 a plurality of electricity generation units arranged in parallel within said electricity

generation/combustion chamber, and

wherein each of said electricity generation units comprises a fuel gas case defining a fuel gas chamber, a cell stack composed of a plurality of cells arranged on one surface of said fuel gas case, a reforming case, an unreformed gas supply pipe connected to said reforming case, and a fuel gas feed pipe connecting said reforming case and said fuel gas case, and

a fuel gas within said fuel gas case is supplied to said cells.

21. The fuel cell assembly according to claim 20, wherein in each of said electricity generation units, said plurality of cells are disposed upright on an upper surface of said fuel gas case, and said reforming case is placed above said cell stack.

22. The fuel cell assembly according to claim 20, wherein in each of said electricity generation units, said fuel gas case is in a slenderly extending rectangular parallelepipedal shape, and said cells are arranged in line in a longitudinal direction of said fuel gas case.

23. The fuel cell assembly according to claim 20, wherein in each of said electricity generation units, said reforming case slenderly extends along said fuel gas case above said cell stack, said unreformed gas supply pipe is connected to one end portion of said reforming case, and said fuel gas feed pipe connects said reforming case and said fuel gas case at other end portion of said reforming case.

24. A fuel cell assembly, which has a housing defining

an electricity generation/combustion chamber, and electricity generation/combustion means disposed within said housing, and in which said electricity generation/combustion means includes a plurality of cell stacks, a fuel gas and an oxygen-containing gas are supplied to said electricity generation/combustion means, and a combustion gas formed within said electricity generation/combustion chamber is discharged from said electricity generation/combustion chamber,

10        wherein a first gas case supplied with one of said oxygen-containing gas and said fuel gas is disposed within said housing,

      said first gas case has a hollow-shaped manifold portion, and a plurality of hollow-shaped ejection portions protruding from one-side flat surface of said manifold portion substantially perpendicularly to said one-side flat surface,

      said ejection portions are arranged with spacing in a first direction on said one-side flat surface,

20        an ejection hole is formed in at least one surface of each of said ejection portions, and

      each of said cell stacks is placed between the adjacent ejection portions.

25    25.    The fuel cell assembly according to claim 24, wherein

      said manifold portion is placed substantially horizontally, with said one-side flat surface being directed upwards.

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26.    The fuel cell assembly according to claim 24, wherein

      said ejection hole is in a form of a slit parallel to said one-side flat surface and extending in a second direction perpendicular to said first direction.

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27. The fuel cell assembly according to claim 24,  
wherein

a plurality of second gas cases of a hollow  
5 rectangular parallelepipedal shape placed on said one-side  
flat surface of said manifold portion between the adjacent  
ejection portions of said first gas case and extending in  
said second direction are disposed within said housing,  
the other of said oxygen-containing gas and said  
10 fuel gas is supplied to said second gas cases, and  
each of said cell stacks is placed on each of said  
second gas cases.